A PROJECT REPORT ON

"Bluetooth Based Smart Door Lock System using Arduino"

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***Abstract*—Physical keys are the most natural way to lock or open a door, and everyone is familiar with it. Although the physical key is a well-proven and well-known technology, it is not without faults. For a lock, there can only be one unique key. Different keys are required for various locks. Carrying a big number of keys is also inconvenient. Smart locks are key-less door locks that let you unlock your door without having to use a real key. A smart lock is an electromagnetically lock that is meant to lock and unlock a door when it receives instructions from an authorized device and executes the authorization procedure using a cryptographic key.**

Keywords—door lock, Arduino, Bluetooth, Smart home, Security

I. INTRODUCTION

A. Background of Study and Motivation

In our daily lives, safety is a major concern. Every person requires a sense of safety. Our security pattern includes an access control system for doors. Traditional locks are no longer as secure as they once were; anyone can gain access by breaking these locks. We need to create a system that will assist 24 hours a day, seven days a week. Only authorized individuals have access to restricted areas thanks to a Bluetooth based door lock system. Arduino is in charge of the entire system. The door opens if the password matches the password entered in Arduino. This password-based bolt structure will provide clients with a more secure and low-effort locking-opening mechanism. Mechanical door locks will be replaced by electronic door locks in the future, thanks to the bluetooth door lock automation system. [1]

B. Project Objectives

The goal of this project is to research and analyze a suitable collection of components for developing a smart door lock using Arduino that provides excellent security and quick access. The following are the specific project goals:

- Familiarity with a smart door locking system based on a microcontroller.
- Using Arduino to create a simple and smart door locking system.

C. A brief outline of the report

This project is divided into ***5 chapters***. ***Chapter 1*** present the background of study and motivation of this project. Chapter one also presents objectives and a brief outline. ***Chapter 2*** provides the literature review of this project. ***Chapter 3*** introduces the project methodology and modeling like working principle, process of work, component, implementation, testing and cost analysis. ***Chapter 4*** presents the results and discussions of this project, also the simulation and experimental results. Finally, ***Chapter 5*** Conclude the project.

II. LITERATURE REVIEW

There are just a few digital approaches for door security locks in the current system. This contemporary smart locking system takes the place of the classic lock and Bluetooth locking method. Modern living is largely reliant on technological advancements, such as opening doors, managing the air conditioning, and regulating the curtains. People want to feel safe in their own homes, offices, and stores. The primary motivation for the development of smart locks is to meet the

needs of people. Some of these systems will be discussed in this section.

- *Internet of Things*

The internet of things, or IoT, is a wireless link that works in a door lock. With the help of IoT-enabled applications, the user may unlock the door with his smartphone. The servo library is introduced after the application is developed by creating a string variable that contains the unique device ID for the lock. The essential concept underlying the door lock's operation is the ID supplied by the Android phone via the created app. [3]

- *Knock-Pattern Using Arduino and GSM Communication*

This system, which consists of Arduino, GSM Module, Servo Motor, and other components, employs a „Secret Knocking Pattern' that is only known by the owner of the safe, luggage, or other property or item on which the device is mounted. For the lock to open, the knocking pattern must be used only at a certain location, which is only known by the owner. The secret pattern can only be changed after the secret knock has been unlocked. Because there is no key to be copied, this approach fully eliminates the worry of duplication. [4]

III. Methodology and Modeling

A. Introduction

In this project, we implemented a Bluetooth-Based Security System Using Arduino & Keypad. As thefts are increasing day by day security is becoming a major concern nowadays. So a digital code lock can secure our home or locker easily. It will open your door only when the right password is entered. Only authorized people are allowed access to the restricted sections due to a password-based door lock mechanism. The Arduino is responsible for the entire project's operation. The desired password can be entered using a 4×3 keypad.

B. Working Principle

- ***Process of Work:***

The purpose of this experiment is to implement a door-locking mechanism that opens or closes the lock on the door automatically with a Bluetooth system. There are two work processes for this experiment which are:

Case 1: The door will be unlocked:

The Bluetooth function will input values. If the value of the Bluetooth becomes 0, the door will be unlocked. We will be able to open the door. The code will pass the value of 90.

Case 2: The door will be locked:

The Bluetooth function will input values. If the value of the Bluetooth becomes 1, the door will be locked. We will not be able to open the door. The cod e will pass the value of 90.

C. Important Components

- Hardware:
  1. Arduino UNO
  2. 9G Metal Gear Servo
  3. 9V Battery
  4. Hc-05 Bluetooth Module
  5. Cocksheet

Arduino UNO:

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) to load new code onto the board -- you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.[7]

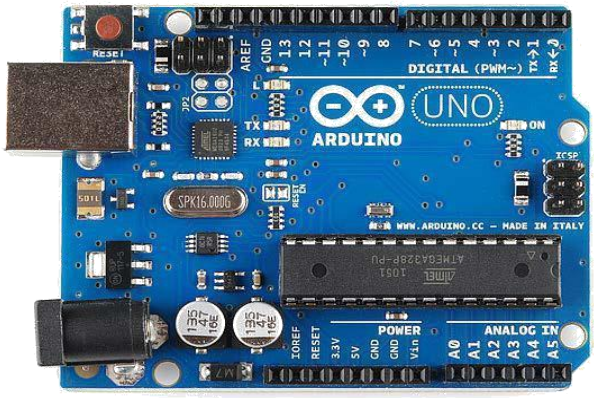


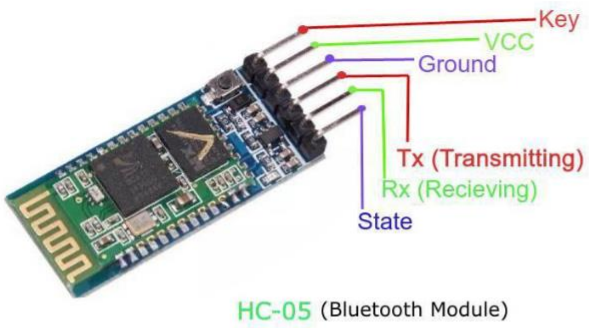
Fig-1: *Adruino UNO*

9G Metal Gear Servo:

The SG90 9g Mini Servo is a 180° rotation servo. It is a Digital Servo Motor that receives and processes PWM signal faster and better. It equips sophisticated internal circuitry that provides good torque, holding power, and faster updates in response to external forces.

Hc-05 Bluetooth Module:

HC-05 uses serial communication to communicate with the electronics. Usually, it is used to connect small devices like mobile phones using a short-range wireless connection to exchange files. It uses the 2.45GHz.



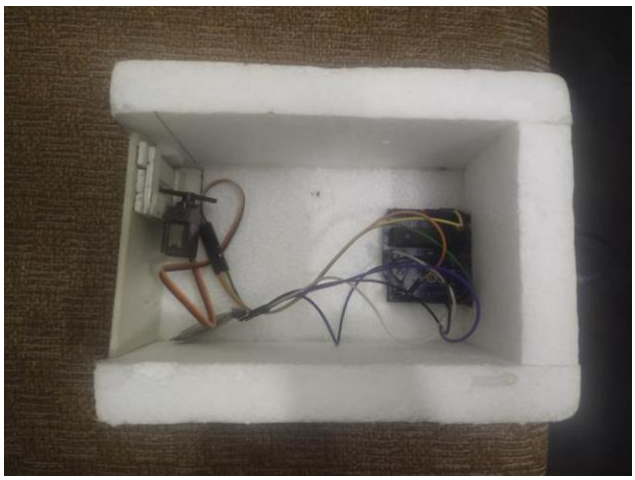
HC-05 (Bluetooth Module)

Cocksheet:

The cocksheet is used to cover the whole implementation So that it can be kept protected and safe from the dangers.

D. Implementation

At first smartphone keypad was connected with 4.Hc-05 Bluetooth Module. Then the Bluetooth module was connected with Arduino UNO board . All the necessary pins were connected with wires.Then the code was implemented using Arduino UNO software. In the code all the necessary inputs and commands were implemented



Source Code:

```
#include <SoftwareSerial.h>
#include <Servo.h>
SoftwareSerial BT(10, 11);
Servo myservo;
char a;
void setup()
{
 BT.begin(9600);
 BT.println("Door connected");
 myservo.attach(2);
// myservo.write(90);
}
void loop()
{
 if (BT.available()){
 a=(BT.read());
 if (a=='1'){ myservo.write(10);
 BT.println("Door locked");
 }else if (a=='0'){
 myservo.write(90);
 BT.println("Door unlocked");

 }
 }
}
```

V. CONCLUSION

Thus “Smart Door Locking System using Arduino” is a modern successor of the conventional door locking system. The conclusion of the discussion of smart Lock using Arduino is the innovation created from the lock system with no more direct contact between the user and the lock. This system is very cost-effective and easy to install. In conclusion, it was discovered that the project performed according to specification and can be implemented. The use of the Arduino UNO microcontroller in this project allows for design simplicity, hence, the project can be achieved in lesser time compared to other techniques previously employed. This work proposes a secure locking/unlocking system based on a Bluetooth and Arduino. Adding Bluetooth function to the Arduino side increase the system security. The system also has a feature for locking itself after some delayed time. This system could be used to prevent houses, companies, institutions from stealing or losing the ordinary system.

VI. REFERENCES

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